

# COMPRESSOR AMPLIFIER

## — 179 - 140 —

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<b>Supply Voltage</b>	$\pm 15V$ dc $\pm 10\%$
<b>Maximum Ripple Voltage</b>	: 0.1 V pp
<b>Current Consumption, steady state</b>	: approx. 100mA
<b>Current Consumption, during heat-up</b>	: approx. 275mA in 45 seconds
<b>Temperature Range</b>	: -20 to $+60^{\circ}\text{C}$ (-4 to $+140^{\circ}\text{F}$ )
<b>Frequency Range (0.5dB points)</b>	: 20 c/s to 20,000 c/s
<b>Input Filter</b>	: see fig. 4
<b>Input Impedance within freq. range</b>	: see Input Terminations fig. 1
<b>Output Impedance within freq. range</b>	: see Output Terminations fig. 2
<b>Minimum Load Impedance</b>	: 100 ohms
<b>Basic Amplification</b>	: see fig. 3 Characteristics
<b>Compression Range</b>	: see fig. 3 Characteristics
<b>Compression Ratio</b>	: adjustable 1:1 2:1 3:1 5:1 20:1
<b>Attack Time</b>	: adjustable 100 microseconds 20dB to 200 milliseconds 20dB (11 steps)
<b>Recovery Time</b>	: adjustable 60 milliseconds 20dB to 4 seconds 20dB and one "Auto" position
<b>"Auto" dual time constants</b>	: 200 msec. upon 15 seconds (11 steps)
<b>Recovery Delay</b>	: switchable 0 or 50 milliseconds
<b>Distortion under static conditions</b>	: less than 0.5% up to 20dB gain reduction
<b>Signal to noise ratio at compression threshold</b>	: 80 dB A-curve
<b>Instrument Output</b>	: 0 to 1 mA for 0 to 20dB compression Linear dB scale
<b>Limiter Function</b>	
<b>Attack Time</b>	: 1.5 millisecond combined with a full-wave logarithmic clipping circuit
<b>Recovery Time</b>	: following the recovery time set for the compressor
<b>Limitation Threshold "Normal"</b>	: +6 dBu output with any of the three output-terminations shown in fig. 2
<b>Note 1</b>	
<b>Limitation Threshold "High"</b>	: +19 dBu output when using the 0.7 : 1 output transformer
<b>Note 1</b>	: +16 dBu output when using the direct output or the 1:1 output transformer
<b>Stereo Operation</b>	

The control voltages of two units may be linked so as to obtain equal gain reduction in the two stereo channels. The control voltage is accessible at the connector.

**Connector** : Tuchel T2700      **Standard Colour** : Dull Black

**Mechanical Outline** : A1-module

Front 40x190mm (1.58x7.5")

Depth 105 mm (4.1")

**Weight** : approx. 1 Kg

(approx. 35 oz.)

**Note 1:** The limitation level stated above applies to steady state conditions. Peaks shorter than 1.5ms will be limited at a level max. 3dB above steady state conditions.

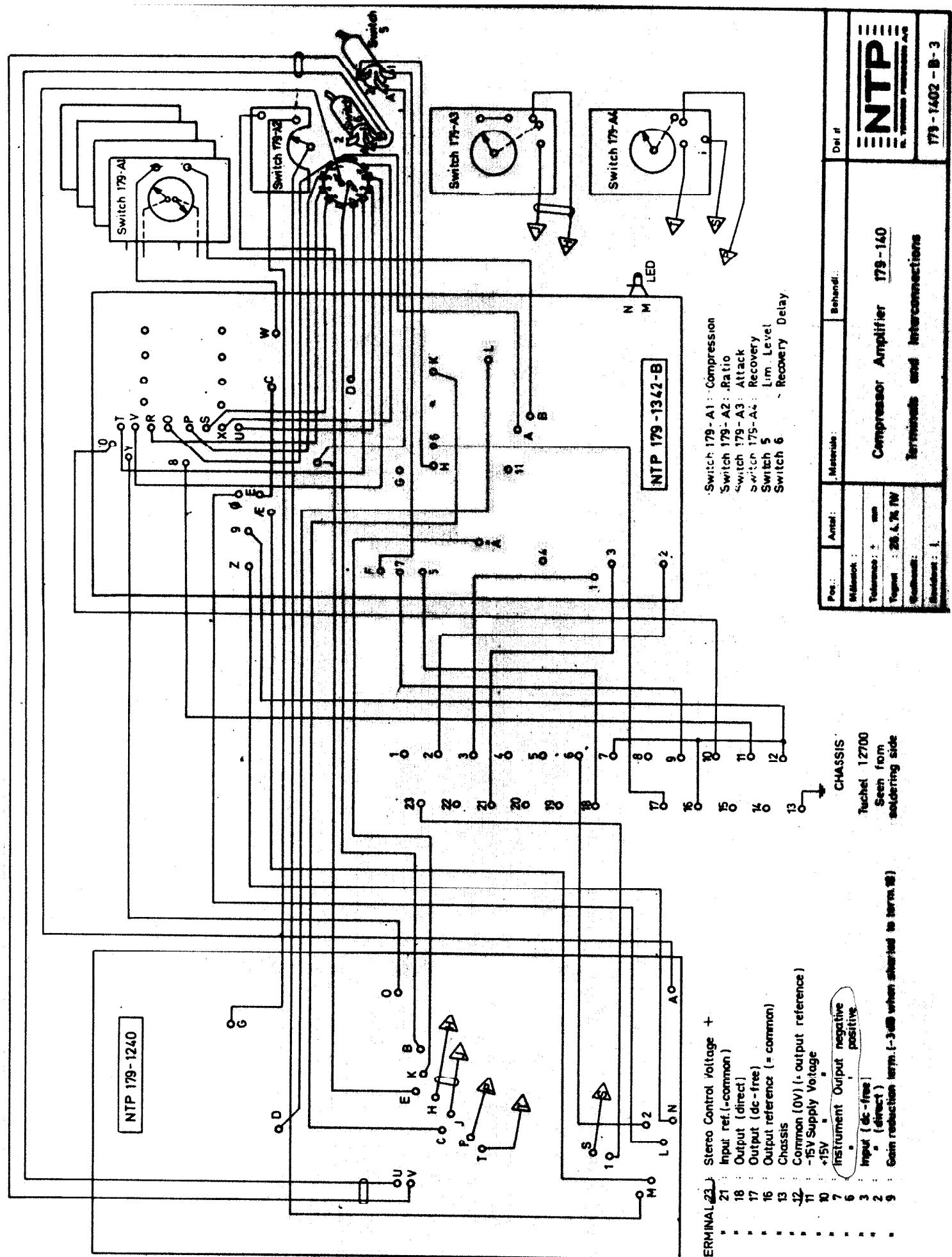


Fig. 3

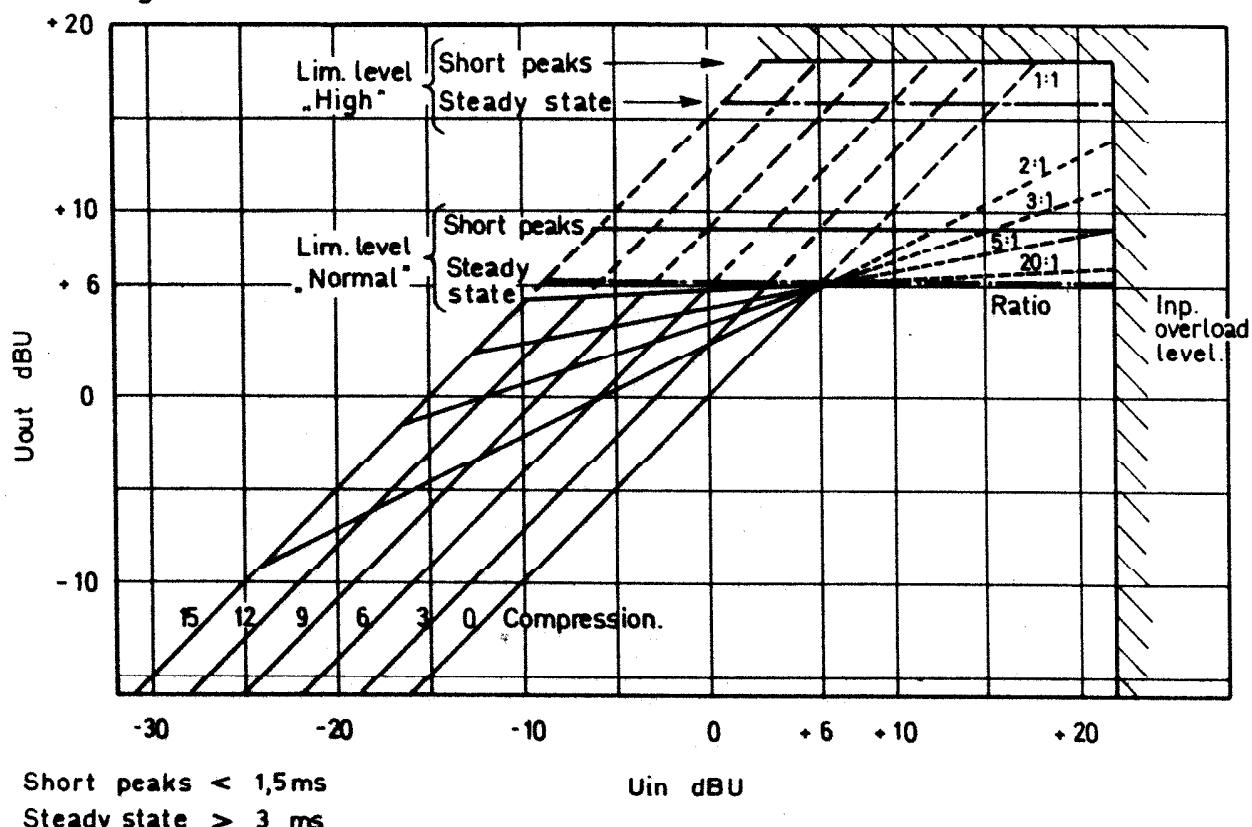
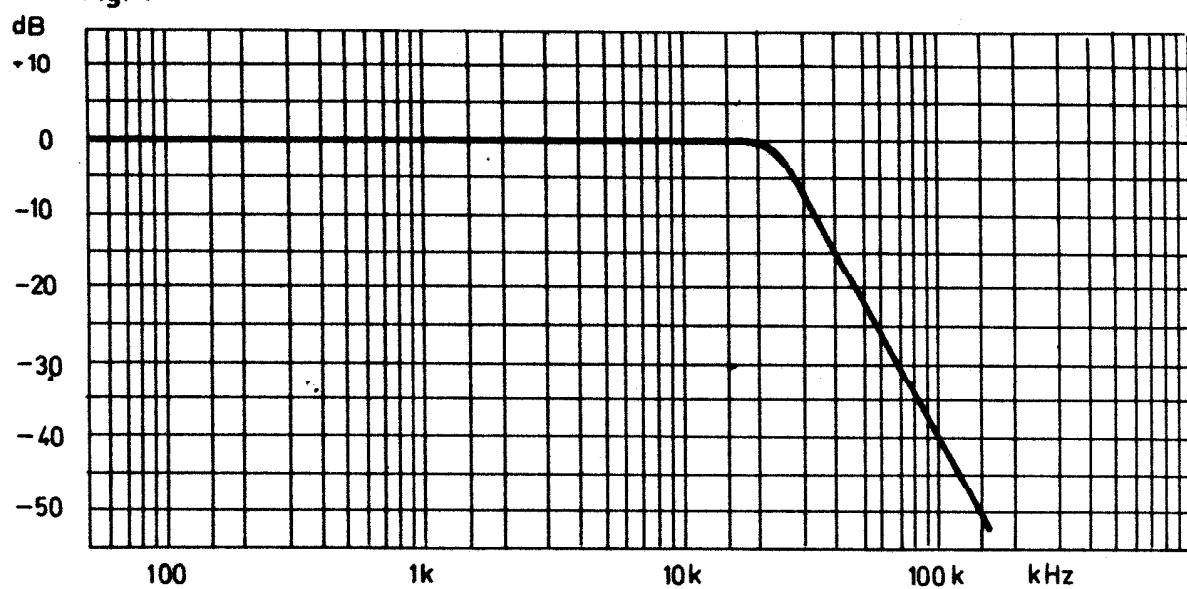


Fig. 4

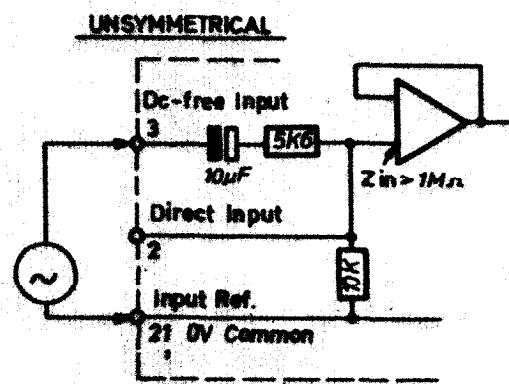


INPUT FILTER CURVE

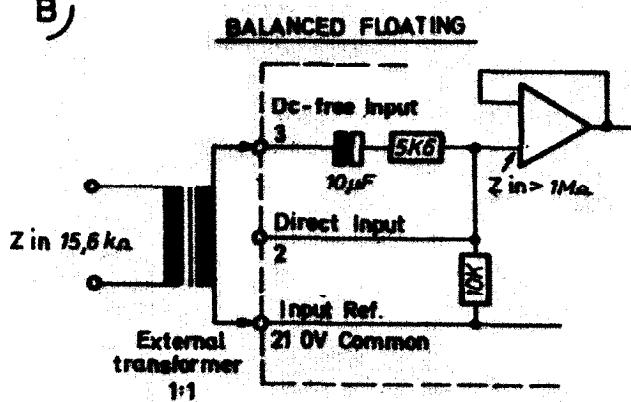
**INPUT TERMINATIONS**

fig. 1

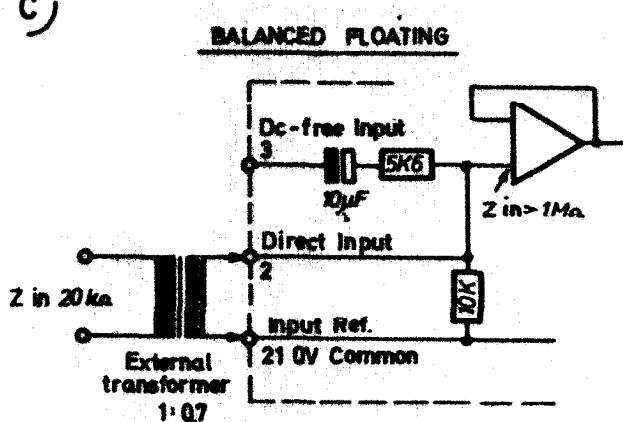
**A)**



**B)**



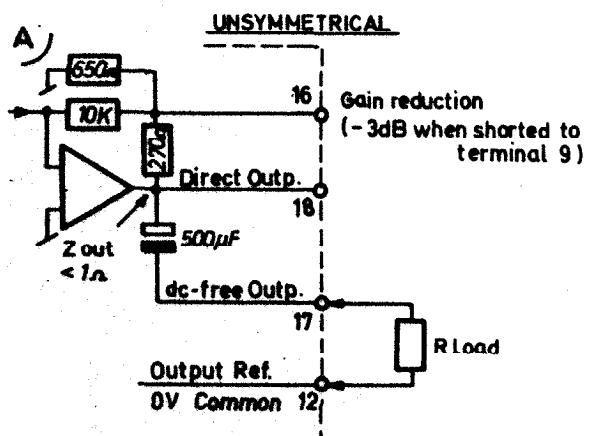
**C)**



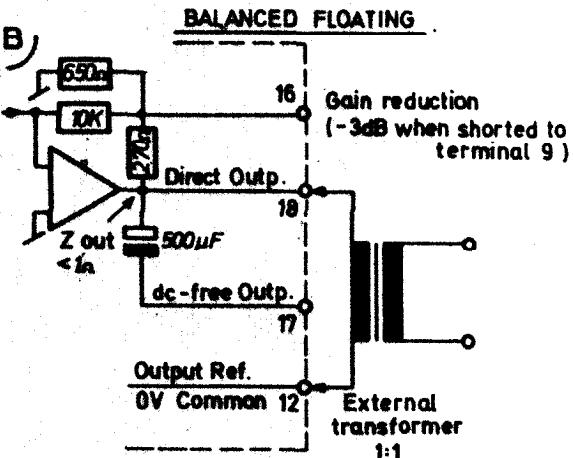
**OUTPUT TERMINATIONS**

fig. 2

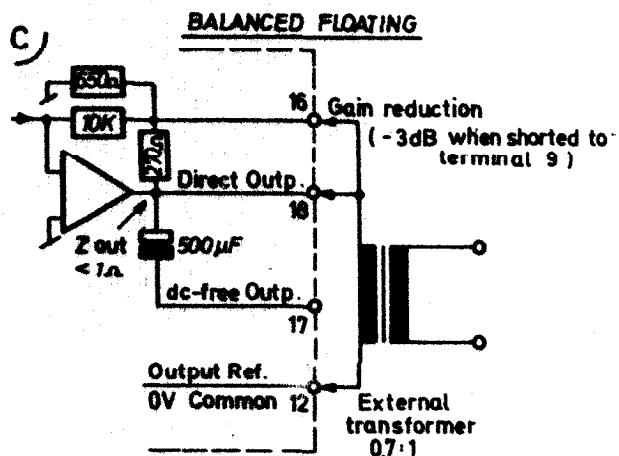
**A)**



**B)**



**C)**



Denne tegning gælder for følgende SN.

leveret til Kajaani og DR.

7380-7414, 7477-7480, 7848-7870, 8101-8105.

Normally the Compressor Amplifier will stay correctly adjusted, except when a component has failed and has been replaced; then it may be necessary to make certain adjustments. Before attempting to make any adjustments, note the permissible indication errors stated in Technical Specifications.

The functions of the trimpotentiometers are as follows:

- P1 Bias adjustment of Op. amp A1
- P2 Compensates for individual pinch-off of the F.E.T. (Q1)
- P3 Compensates for individual slope  $\frac{\Delta R_{SD}}{\Delta V_{GD}}$  of the F.E.T.
- P4 Linearity adjustment of the FET Attenuator circuit.
- P5 Adjusts for minimum distortion of the FET attenuator.
- P6 Adjusts the threshold level.

Do not attempt to make any adjustments until the current consumption has fallen to a steady level approx. 100 mA after 60 sec. Correct sequence of adjustments is as follows:

a. Bias adjustment of P1

Conditions: No input signal.  
Recovery switch in pos. 0.06 sec.

Connect a DC voltmeter (or DC-oscilloscope sens. approx. 20mV/div.) between TP7 and TP1.  
P1 is adjusted until the voltage measured is the same whether TP2 is connected to TP9 or not.

b. Pinch-off adjustment of P2

Conditions: Input signal +6dBu 1kHz  
Ratio switch in pos. 1:1  
Lim. level switch in pos. "high"

P2 is adjusted until the output voltage is +6dBu (0dB amplification).

The adjustment range can be altered by connecting or disconnecting R15 and/or R16.

c. Slope dB/V and Linearity adjustment of P3 and P4

Conditions: Like referred under pos. b.

A floating external DC-source 0-6 V is connected between term. 3 and 5, term. 3 positive. The DC voltage is set to 3.0 Volt, and P3 is adjusted so that the output level is -9dBu (15 dB attenuation). Now the DC voltage is set to

6.0 Volt, and P4 is adjusted until the output level is -24 dBu (30 dB attenuation). Because of mutual dependence between P3 and P4 the adjustments are repeated until correct output level is obtained.

d. Threshold level adjustment of P6

Conditions: Input signal +6 dBu 1kHz  
Ratio switch in pos. 20:1  
Lim. level switch in pos. "high"  
Compression switch in pos. 15 dB

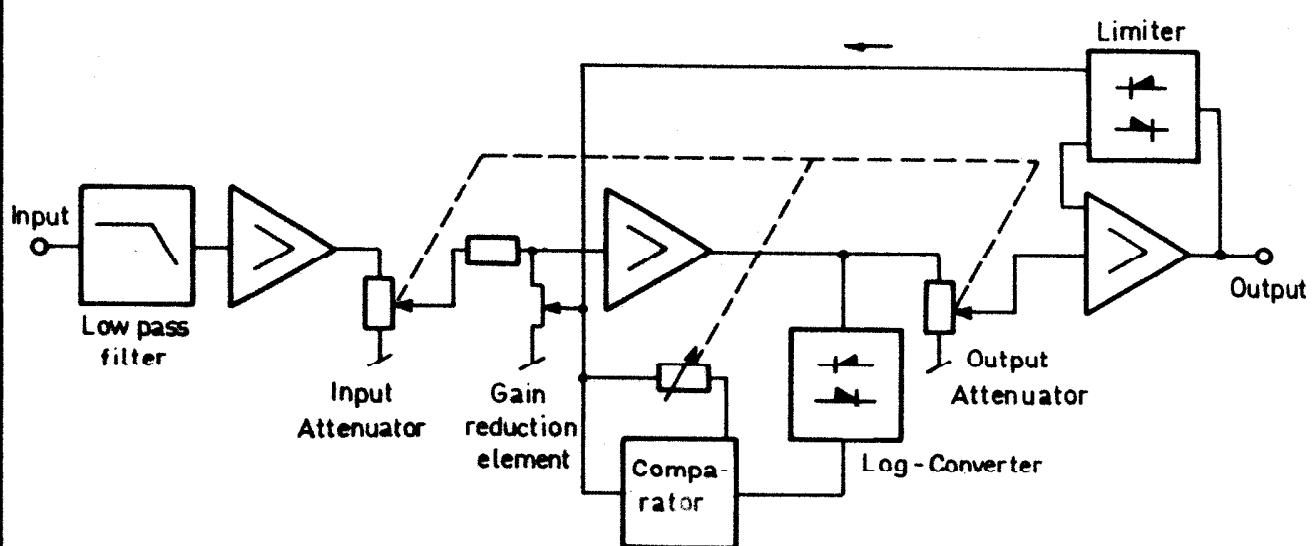
P6 is adjusted to an output level of +6 dBu

e. Distortion adjustment of P5

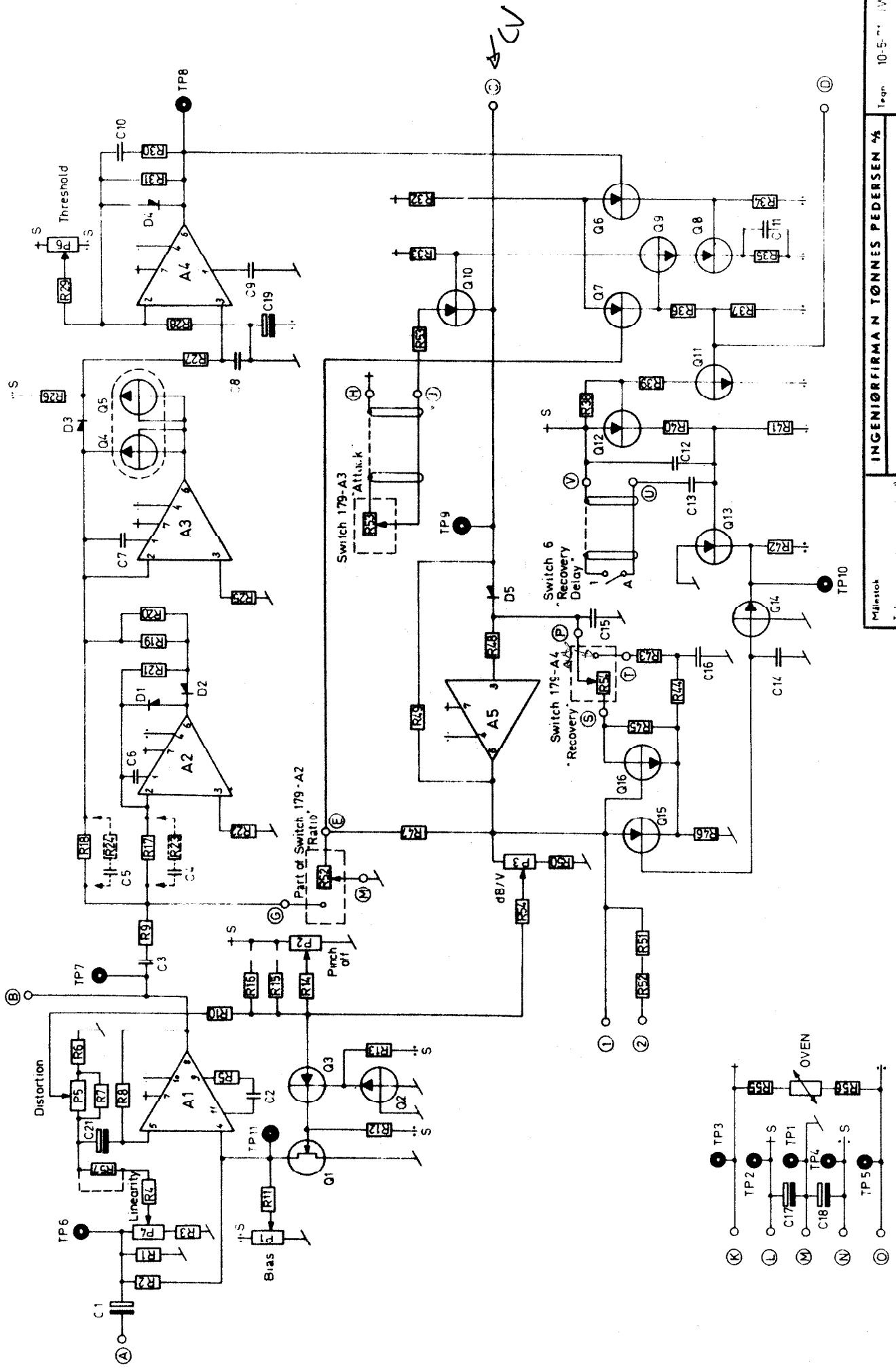
Conditions: Ratio switch in pos. 2:1  
Input level and the other controls are set like under pos. d.

P5 is adjusted to minimum distortion.

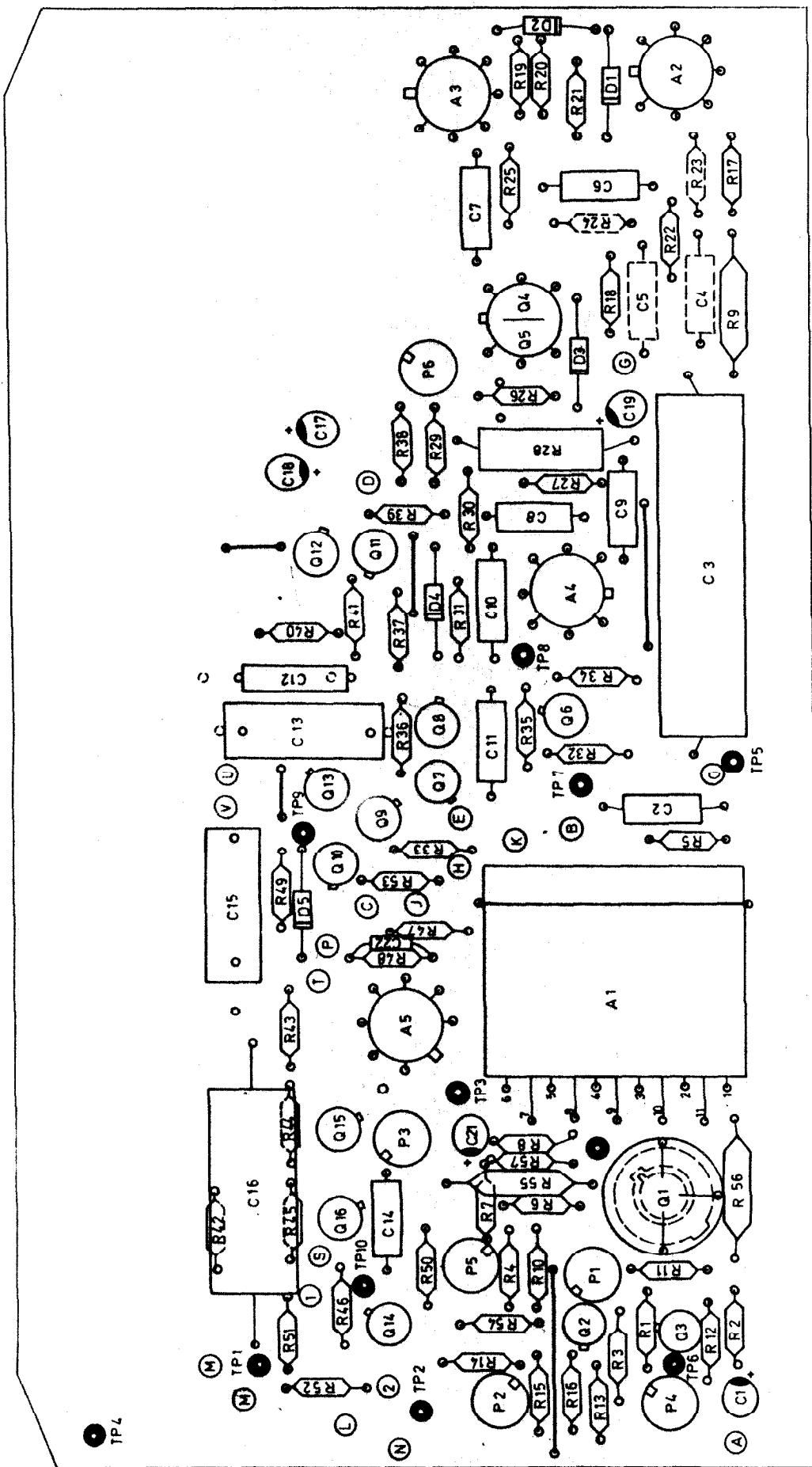
Because of interaction between P5 and P2, the adjustment mentioned under pos. b is carried out once more.



BLOCK DIAGRAM



Milesiok  
Tolerence  
Materialis  
Belendi  
De af  
Arrel

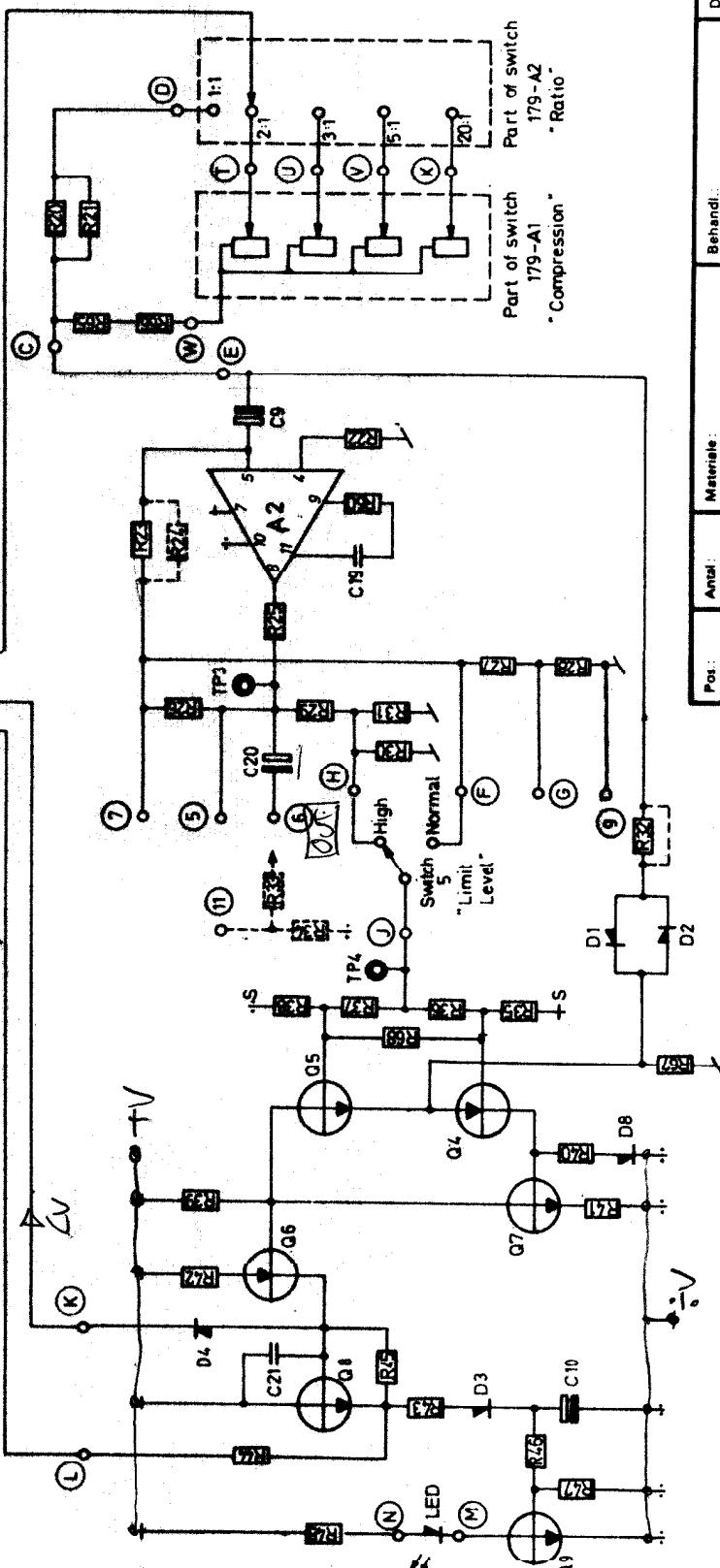
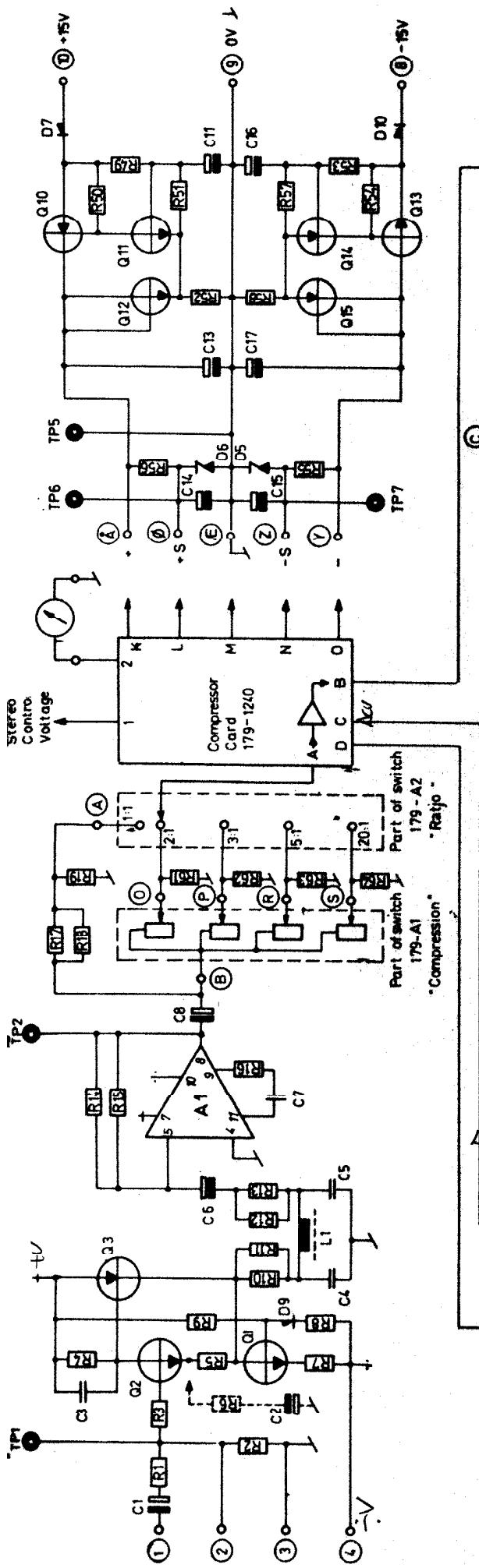


Materiale	2:1	INGENØRFIRMAN TØNNES PEDERSEN &		Legn.	9-6-71 i W
Toleranse	+ mm + 0	Compressor	Amplifier	Goth.	B.M.
Materiale		179-130	179-140		TEGNING NR.
Beklæd.		Compressor	Card	179 - 1240	
Del #		Component	Layout		179 - 1341-A-3
Antal					

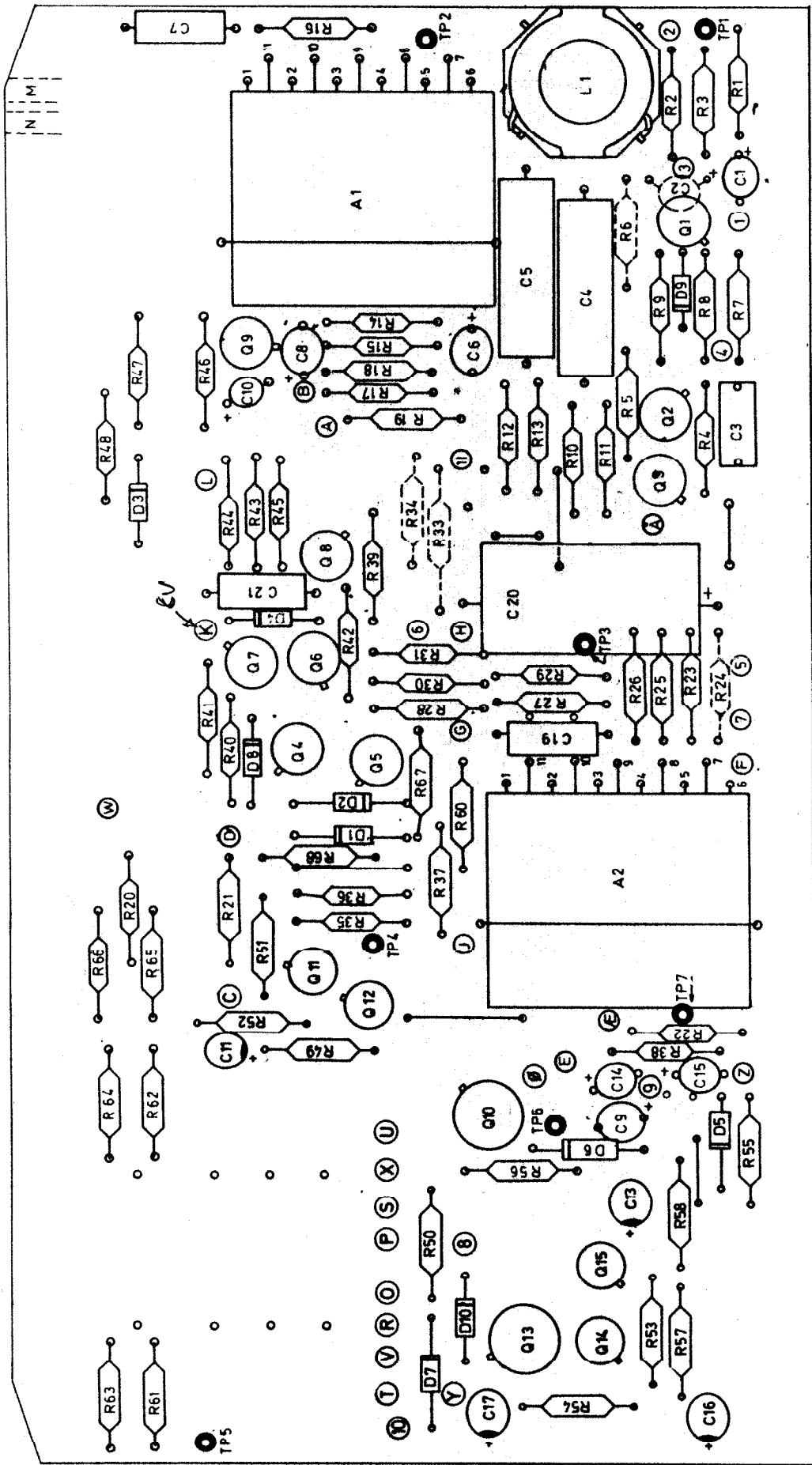
POS.	TEGN. NR.	BETEGNELSE					MATERIALE	ANT.
R1		Resistor	6.8kΩ	1/8W	5%		Resista SK2	
R2		"	6.8kΩ	"	"		"	
R3		"	1kΩ	"	"		"	
R4		"	4.7kΩ	"	"		"	
R5		"	220 Ω	"	"		"	
R6		"	680 Ω	"	"		"	
R7		"	390 Ω	"	"		"	
R8		"	10kΩ	"	"		"	
R9		"	330 Ω	1/3W	"		Beyschlag	
R10		"	18kΩ	1/8W	"		Resista SK2	
R11		"	1MΩ	"	"		"	
R12		"	10kΩ	"	"		"	
R13		"	10kΩ	"	"		"	
R14		"	68kΩ	"	"		"	
R15		"	82kΩ	"	"		"	
R16		"	47kΩ	"	"		"	
R17		"	10kΩ	"	"		"	
R18		"	10kΩ	"	"		"	
R19		"	10kΩ	"	"		"	
R20		"	10kΩ	"	"		"	
R21		"	10kΩ	"	"		"	
R22		"	10kΩ	"	"		"	
R23		"	not used (Appx. 22kΩ when preamphasis)					
R24		"	"	( " 1kΩ " )	"		"	
R25		"	4.7kΩ	"	"		"	
R26		"	120kΩ	"	"		"	
R27		"	10kΩ	"	"		"	
R28	179-1212-A4	"	820 Ω	1/3W	5%		NTP	
R29		"	22kΩ	1/8W	"		Resista SK2	
R30		"	330 Ω	"	"		"	
R31		"	1.8kΩ	"	"		"	
R32		"	68kΩ	"	"		"	
R33		"	3.3kΩ	"	"		"	
R34		"	47kΩ	"	"		"	
R35		"	10kΩ	"	"		"	
R36		"	47kΩ	"	"		"	
R37		"	10kΩ	"	"		"	
R38		"	47kΩ	"	"		"	
R39		"	47kΩ	"	"		"	
R40		"	68 Ω	"	"		"	
R41		"	680kΩ	"	"		"	
R42		"	22kΩ	"	"		"	
R43		"	220kΩ	"	"		"	
R44		"	470kΩ	"	"		"	
R45		"	470kΩ	"	"		"	
R46		"	2.2kΩ	"	"		"	
R47		"	3.3kΩ	"	"		"	
R48		"	10kΩ	"	"		"	
SIG./DATO	INGENIØRFIRMA N. TØNNES PEDERSEN A/S						STYKLISTE	
BM/DG 5.5.71	COMPRESSOR AMPLIFIER 179-130 (140) Compressor Card 179-1240 Electrical Partslist						3. Blad - Blad 1	
							179-1331-A-4	

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.
R49		Resistor 470kΩ 1/8W 5%	Resista SK2	
R50		" 470 Ω " "	"	
R51		" 39 Ω " "	"	
R52		" 3.9kΩ " "	"	
R53		" 220 Ω " "	"	
R54		" 18kΩ " "	"	
R55		" 47 Ω 1/3W " "	Beyschlag	
R56		" 47 Ω 1/3W " "	"	
R57		" 4.7kΩ 1/8W " "	Resista SK 2	
C1		Tantal Cap. 100μF/3V ETP3	ERO	
C2		Styroflex Cap. 47 pf B31310 5% J	Siemens	
C3		Polyester Cap. 10μF/63V 10% MKT 1813-547/06	Eromet	
C4		not used (when preamphasis 3,3 nf)		
C5		not used ( " " 6,7 nf)		
C6		Styroflex Cap. 330 pf B31310 5% J	Siemens	
C7		" " 330 pf " " "	"	
C8		" " 100 pf " " "	"	
C9		" " 470 pf " " "	"	
C10		" " 330 pf " " "	"	
C11		" " 330 pf " " "	"	
C12		" " 6,8 nf/B31310 5% J	"	
C13		Mepo Cap. 0,15μF/250V B32234	Philips	
C14		Styroflex Cap. 330 pf B31310 5% J	Siemens	
C15		Mepo Cap. 0.22μF/250V B32234 10%	"	
C16		Polyester Cap. 4.7μF/63V 10% MKT 1813-547/06	Eromet	
C17		Tantal Cap. 10μF/16V ETP2	ERO	
C18		" " 10μF/16V ETP2	"	
C19		" " 33μF/25V ETP3	"	
C20		not used		
C21		Tantal Cap. 220μF/3V ETP4	ERO	
C22		Styroflex Cap. 22pf/160V	Siemens	
D1		Diode 1 N 4148	Texas Instr.	
D2		" 1 N 4148	" "	
D3		" 1 N 4148	" "	
D4		" 1 N 4148	" "	
D5		" 1 N 4148	" "	
Q1	179-1218		AKERS	
	A4	F.E.T. Si 216 N specially selected		
Q2		Transistor BC 107 B (A)	Siemens	
Q3		" BC 177 B (A)	"	
Q4		Dual Transistor MD 8001	Motorola	
Q5				
Q6		Transistor BC 177 B (A)	Siemens	
Q7		" BC 177 B (A)	"	
Q8		" BC 177 B (A)	"	
Q9		" BC 107 B (A)	"	
Q10		" BC 177 B (A)	"	
SIG./DATO	INGENIØRFIRMA N. TØNNES PEDERSEN A/S			STYKLISTE
BM/DG 5.5.71	COMPRESSOR AMPLIFIER 179-130 (140) Compressor Card 179-1240 Electrical Partslist			...3. Blade - Blad ... 179-1331-A-4

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.
Q11		Transistor BC 107 B (A)	Siemens	
Q12		" BC 177 B (A)	"	
Q13		" BC 177 B (A)	"	
Q14		" BC 107 B (A)	"	
Q15		" BC 177 B (A)	"	
Q16		" BC 107 B (A)	"	
		Transistor Oven type 5 ST 1-2 (To -18) 80°C	JERMYN	
A1		Linear Amplifier M-100	NTP	
A2		Operational Amplifier LM 301 A	National Semi	
A3		" " LM 301 A	" "	
A4		" " LM 301 A	" "	
A5		" " LM 310	" "	
P1		Trim Potentiometer 10kΩ 3329 H-103	Bourns	
P2		" " 1kΩ 3329 H-102	"	
P3		" " 1kΩ 3329 H-102	"	
P4		" " 1kΩ 3329 H-102	"	
P5		" " 1kΩ 3329 H-102	"	
P6		" " 10kΩ 3329 H-103	"	
		Copper tube rivets S 6086	United Shoe	10
		Transistor spacers To 18-002		12
	179-1240 B-3	Printed Circuit Board 179-1240-B	NTP	
SIG./DATO	INGENIØRFIRMA N. TØNNES PEDERSEN &	STYKLISTER		
BM D.G 5.5.71	COMPRESSOR AMPLIFIER 179-130 (140) Compressor Card 179-1240 Electrical Partslist	3. Blade - Blad 3 179-1331-A-4		



Pos.:	Ant.:	Material:	Behandl.:	Del. st:
Mässstock :		Control	Cast	
Toleranz: $\pm$	mm			
Target:	301.74 W	Compressor Amplifier	179-130 (179-140)	<b>NTP</b> N. THERM. PRECISION A/S
Geometrie:		Amplifier Card	179-1342-B	
Revidiert:		Diagram		179-1332-B-3



Pos.:	Ant.:	Material:	Behandl.:	Det. #:
Messstck	2:1			
Toleranz:	± mm			
Tragier	: 30.174 NW	Compressor	Amplifier 179-130 (179-140)	
Stückmaß:		Amplifier Card	179-1342-B	
Revidatur:		Component	Layout	

POS.	TEGN. NR.	BETEGNELSE					MATERIALE	ANT.
R1		Resistor	5.6kΩ	5%	1/8W		Resista SK2 (Beyschlag)	
R2		"	10kΩ	"	"		"	
R3		"	220 Ω	"	"		"	
R4		"	2.2kΩ	"	"		"	
R5		"	1.5kΩ	"	"		"	
R6		"	not used (390Ω - -8dBu)				"	
R7		"	68 Ω	"	"		"	
R8		"	270 Ω	"	"		"	
R9		"	10kΩ	"	"		"	
R10		"	22kΩ	"	"		"	
R11		"	2.2kΩ	"	"		"	
R12		"	2.2kΩ	"	"		"	
R13		"	22kΩ	"	"		"	
R14		"	4.7kΩ	"	"		"	
R15		"	27kΩ	"	"		"	
R16		"	220 Ω	"	"		"	
R17		"	150kΩ	"	"		"	
R18		"	27kΩ	"	"		"	
R19		"	470 Ω	"	"		"	
R20		"	8.2kΩ	"	"		"	
R21		"	1.5kΩ	"	"		"	
R22		"	10kΩ	"	"		"	
R23		"	10kΩ	"	"		"	
R24		"	not used					
R25		"	18 Ω	"	"		"	
R26		"	270 Ω	"	"		"	
R27		"	180 Ω	"	"		"	
R28		"	470 Ω	"	"		"	
R29		"	1kΩ	"	"		"	
R30		"	1.8kΩ	"	"		"	
R31		"	330 Ω	"	"		"	
R32		"	strapped	"	"		"	
R33		"	not used (330Ω - -8dBu)				"	
R34		"	not used (82Ω - " )				"	
R35		"	47 kΩ	"	"		"	
R36		"	5,6kΩ	"	"		"	
R37		"	5,6kΩ	"	"		"	
R38		"	47kΩ	"	"		"	
R39		"	2.2kΩ	"	"		"	
R40		"	2.2kΩ	"	"		"	
R41		"	2.2kΩ	"	"		"	
R42		"	2.7kΩ	"	"		"	

SIG./DATO

INGENIØRFIRMA N. TØNNES PEDERSEN A/S

STYKLISTE

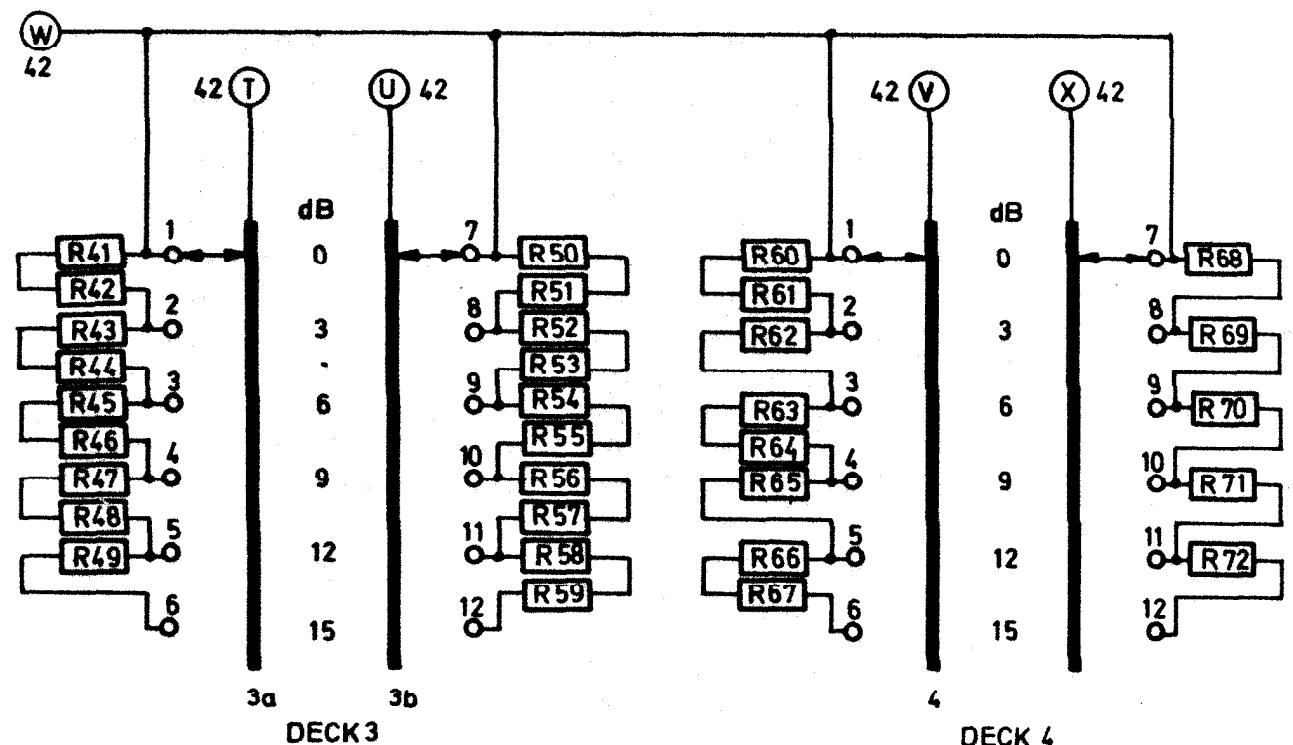
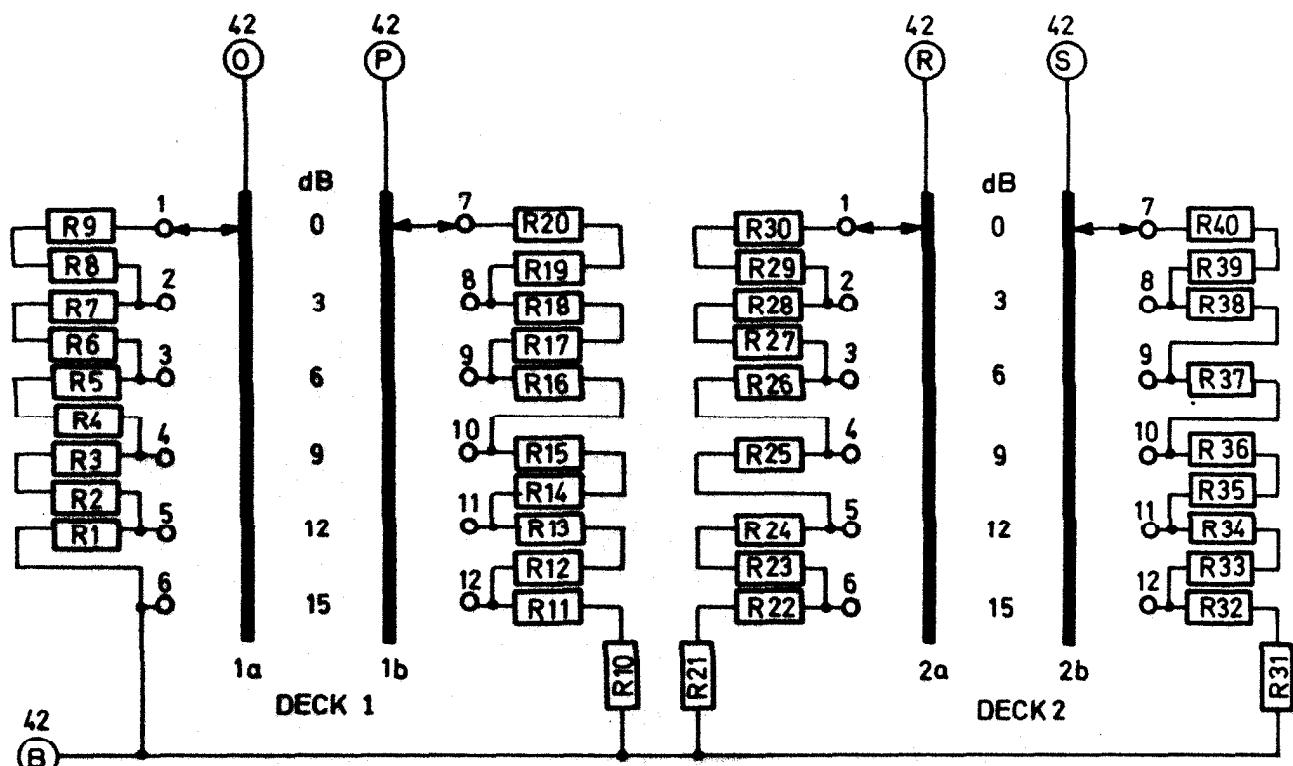
BM/DG  
3.5.71COMPRESSOR AMPLIFIER 179-130 (140)  
Amplifier Card 179-1342  
Electrical Partalist

3.....Blade - Blad 1.....

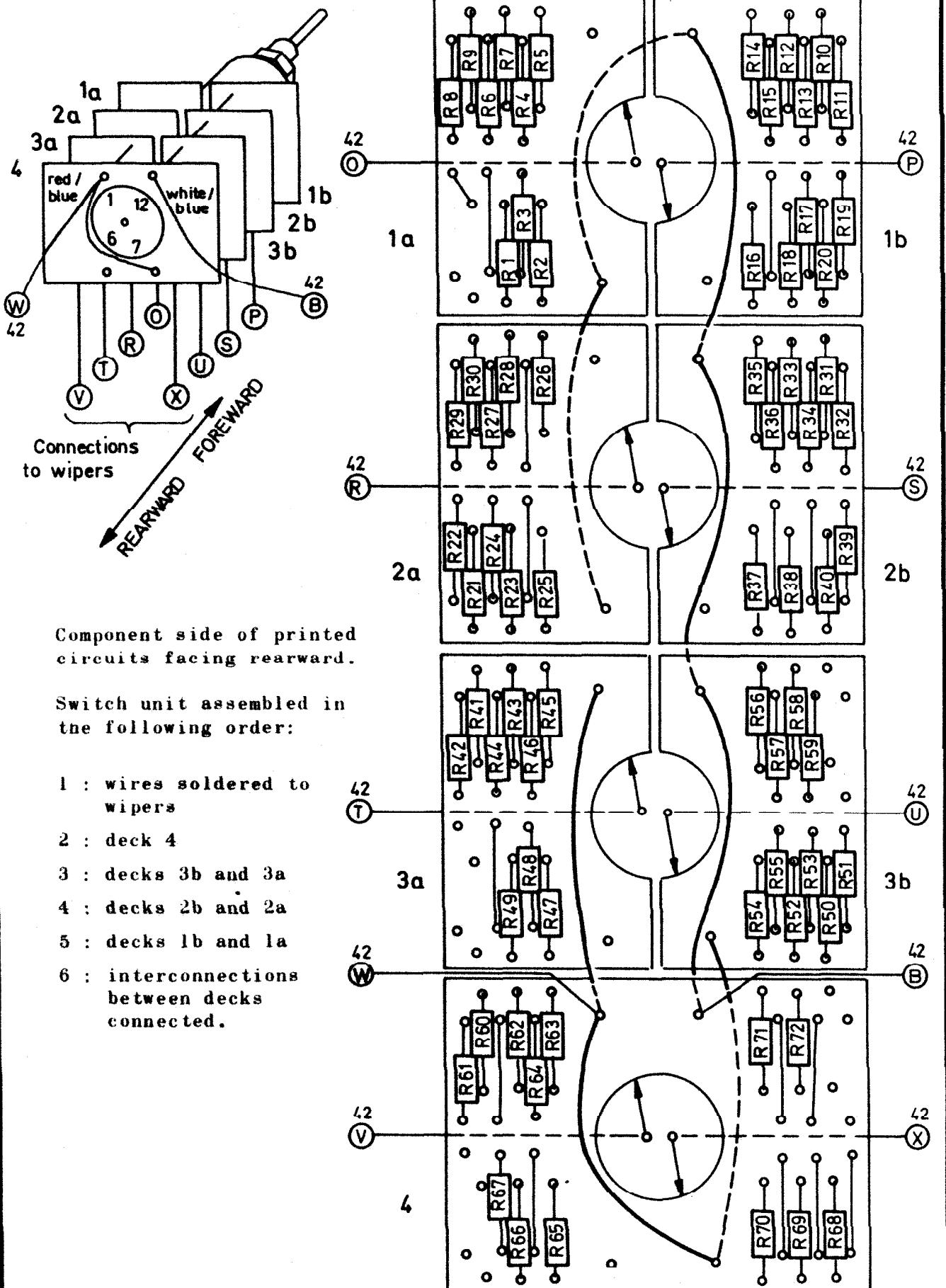
179-1333-B-4

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.
R43		Resistor 470 $\Omega$ 5% 1/8W	Resista SK2 (Beyschlag)	
R44		" 47k $\Omega$ "	"	
R45		" 470k $\Omega$ "	"	
R46		" 100k $\Omega$ "	"	
R47		" 100k $\Omega$ "	"	
R48		" 2.2k $\Omega$ "	"	
R49		" 22K "	"	
R50		" 10k "	"	
R51		" 18k "	"	
R52		" 6K8 "	"	
R53		" 22K "	"	
R54		" 10K "	"	
R55		" 560 $\Omega$ "	"	
R56		" 470 $\Omega$ "	"	
R57		" 18k "	"	
R58		" 6K8 "	"	
R59		" not used "	"	
R60		" 220 $\Omega$ "	"	
R61		" 470 $\Omega$ "	"	
R62		" 470 $\Omega$ "	"	
R63		" 470 $\Omega$ "	"	
R64		" 470 $\Omega$ "	"	
R65		" 2.7k $\Omega$ "	"	
R66		" 120 $\Omega$ "	"	
R67		" 470 $\Omega$ "	"	
R68		" 220k $\Omega$ "	"	
C1		Tantal Cap. 22 $\mu$ F/16V ETP3	ERO	
C2		" " not used (100 $\mu$ F/3V)		
C3		Styreflex Cap. 470 pF B31310 5% J	Siemens	
C4		" 4.7 nF "	"	
C5		" 4.7 nF "	"	
C6		Tantal Cap. 33 $\mu$ F/10V ETP3	ERO	
C7		Styreflex Cap. 100 pF B31310 5% J	Siemens	
C8		Tantal Cap. 100 $\mu$ F/3V ETP3	ERO	
C9		" " 100 $\mu$ F/3V ETP3	"	
C10		" " 1 $\mu$ F/35V ETP1	"	
C11		" " 10 $\mu$ F/35VV "	"	
C12		Styreflex Cap. not used	Siemens	
C13		Tantal Cap. 10 $\mu$ F/35V ETP1	ERO	
C14		" " 10 $\mu$ F/16V	"	
C15		" " 10 $\mu$ F/16V	"	
C16		" " 10 $\mu$ F/35V	"	
C17		" " 10 $\mu$ F/35V	"	
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN A/S	STYKLISTE	
HM/DG 3.5.71		COMPRESSOR AMPLIFIER 179-130 (140) Amplifier Card 179-1342 Electrical Partslist	3 Blad - Blad 2 179-1333-B-4	

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.
C18		Styreflex Cap. not used	Siemens	
C19		" " 100 pF B31310 5% J	"	
C20		El.lyt. cap. 500μF/15V EB	ROE	
C21		Styreflex Cap. 220 pF B31310 5% J	Siemens	
D3-4	+ D8+D9	Si-diode 1 N 4148	Texas Instr.	4
D5-6		Si-Zenerdiode 1 N 821	Motorola	2
D7+D10		Si-diode 10 D 1	J. R.	2
Q1		Transistor BC 107 B (A)	Siemens	
Q2		" BC 107 B (A)	"	
Q3		" BC 177 B (A)	"	
Q4		" BC 177 B (A)	"	
Q5		" BC 107 B (A)	"	
Q6		" BC 177 B (A)	"	
Q7		" BC 107 B (A)	"	
Q8		" BC 107 B (A)	"	
Q9		" BC 107 B (A)	"	
Q10		" BC 161-16 (10)	"	
Q11		" BC 107 B	"	
Q12		" BC 107 B	"	
Q13		" BC 141-16 (10)	"	
Q14		" BC 177 B	"	
Q15		" BC 177 B	"	
D1+2		Diode IN 4152 (IN 4153)	Texas o.a.	
A1		Amplifier M-100	NTP	
A2		" M-100	"	
L1	179-1217- A-4	Coil consists of: Potcore: B65651-K0250-A022 Bobin : B65652-A0000-M001 Tag plate: B65655-A0007-X000 Spring : 8x11	Siemens	
	179-1342- B-3	Printed Circuit Board 179-1342- B  Copper Tube rivets S6086 Transistor Spacers To 18-002 " " To 518-003	NTP  United Shoe	7 11 1
SIG./DATO	INGENIØRFIRMA N. TØNNES PEDERSEN A/S			STYKLISTE
BM/DG 3.5.71	COMPRESSOR AMPLIFIER 179-130 (140) Amplifier Card 179-1342 Electrical Partslist			3. Blade - Blad 3 179-1333-B-4



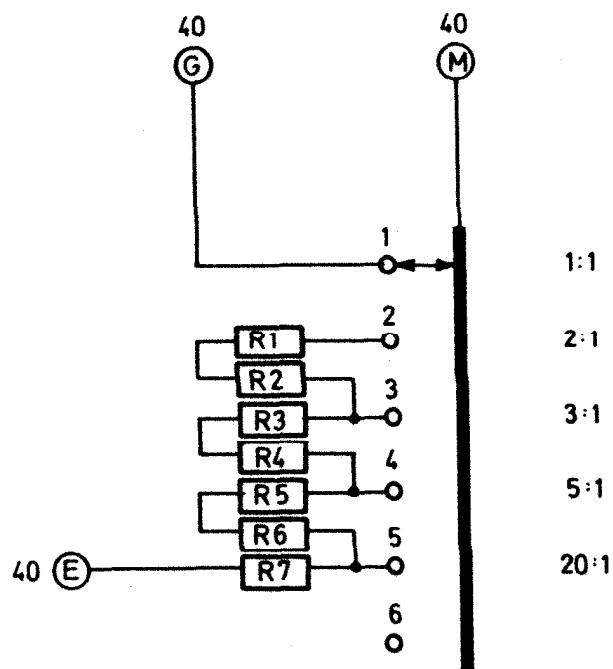
Mølestok		INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	13-5-71 I.W.
Tolerance	± mm ± °	Switch Unit 179-A1 (part of 179-120)	Godk.	
Materialer				TEGNING NR.
Behandl.		Function	Compression	
Del af		Diagram		179 - A130 - A - 4
Antal				



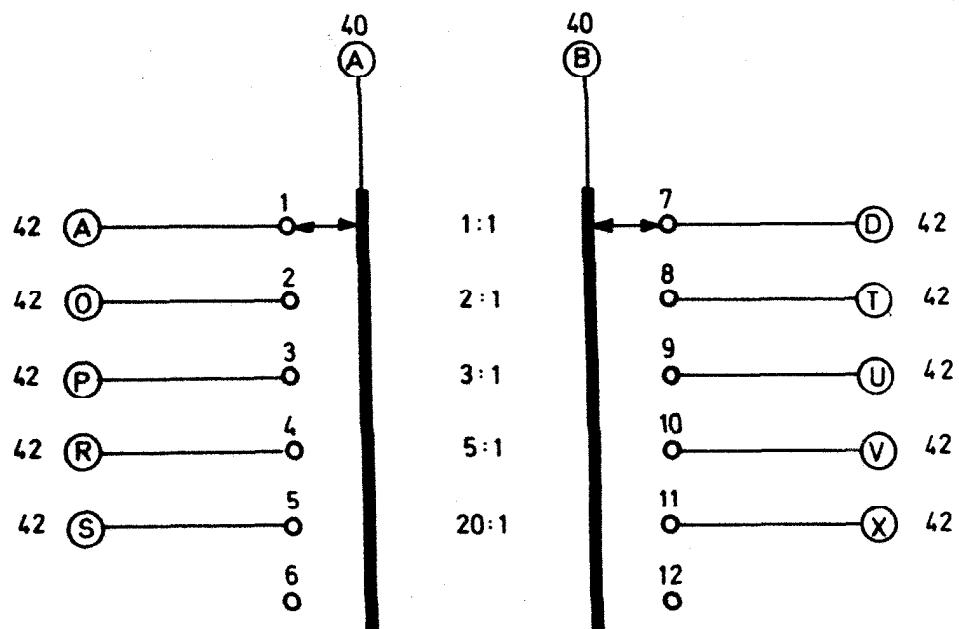
Målestok	2:1	INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	12-5-71. IW
Tolerance	$\pm$ mm $\pm$ °	Switch Unit 179-A1 (part of 179-120)	Godk.	
Materiale				
Behandl.		Function: Compression	TEGNING NR.	
Del af		Component Lay - out		179 - A141-A-4
Antal				

POS.	TEGN. NR.	BETEGNELSE					MATERIALE	ANT.
R1		Resistor	330 $\Omega$	1/8W	5%		Resista SK 2	
R2		"	330 $\Omega$	"	"		"	
R3		"	330 $\Omega$	"	"		"	
R4		"	100 $\Omega$	"	"		"	
R5		"	1.2k $\Omega$	"	"		"	
R6		"	390 $\Omega$	"	"		"	
R7		"	2.2k $\Omega$	"	"		"	
R8		"	560 $\Omega$	"	"		"	
R9		"	4.7k $\Omega$	"	"		"	
R10		"	390 $\Omega$	"	"		"	
R11		"	68 $\Omega$	"	"		"	
R12		"	470 $\Omega$	"	"		"	
R13		"	68 $\Omega$	"	"		"	
R14		"	820 $\Omega$	"	"		"	
R15		"	56 $\Omega$	"	"		"	
R16		"	1.5k $\Omega$	"	"		"	
R17		"	330 $\Omega$	"	"		"	
R18		"	2.2k $\Omega$	"	"		"	
R19		"	270 $\Omega$	"	"		"	
R20		"	3.9k $\Omega$	"	"		"	
R21		"	820 $\Omega$	"	"		"	
R22		"	56 $\Omega$	"	"		"	
R23		"	560 $\Omega$	"	"		"	
R24		"	100 $\Omega$	"	"		"	
R25		"	1k $\Omega$	"	"		"	
R26		"	1.5k $\Omega$	"	"		"	
R27		"	220 $\Omega$	"	"		"	
R28		"	2.2k $\Omega$	"	"		"	
R29		"	330 $\Omega$	"	"		"	
R30		"	3.3k $\Omega$	"	"		"	
R31		"	1.2k $\Omega$	"	"		"	
R32		"	180 $\Omega$	"	"		"	
R33		"	680 $\Omega$	"	"		"	
R34		"	47 $\Omega$	"	"		"	
R35		"	1k $\Omega$	"	"		"	
R36		"	68 $\Omega$	"	"		"	
R37		"	1.5k $\Omega$	"	"		"	
R38		"	2.2k $\Omega$	"	"		"	
R39		"	470 $\Omega$	"	"		"	
R40		"	2.7k $\Omega$	"	"		"	
R41		"	1k $\Omega$	"	"		"	
R42		"	150 $\Omega$	"	"		"	
R43		"	1.5k $\Omega$	"	"		"	
R44		"	150 $\Omega$	"	"		"	
R45		"	2.2k $\Omega$	"	"		"	
R46		"	120 $\Omega$	"	"		"	
R47		"	2.7k $\Omega$	"	"		"	
E48		"	470 $\Omega$	"	"		"	
SIG./DATO		INGENØRFIRMA N. TØNNES PEDERSEN %					STYKLISTE	
30.4.71		Switch Unit 179-A1 (part of 179-120)					2. Blad - Blad 1	
BM/DG		Electrical Partslist					179-A131-A 4	

POS.	TEGN. NR.	BETEGNELSE					MATERIALE	ANT.					
R49		Resistor	4.7kΩ	1/8W	5%		Resista SK 2						
R50		"	470 Ω	"	"		"						
R51		"	56 Ω	"	"		"						
R52		"	560 Ω	"	"		"						
R53		"	68 Ω	"	"		"						
R54		"	680 Ω	"	"		"						
R55		"	82 Ω	"	"		"						
R56		"	820 Ω	"	"		"						
R57		"	56 Ω	"	"		"						
R58		"	1kΩ	"	"		"						
R59		"	82 Ω	"	"		"						
R60		"	220 Ω	"	"		"						
R61		"	33 Ω	"	"		"						
R62		"	270 Ω	"	"		"						
R63		"	270 Ω	"	"		"						
R64		"	39 Ω	"	"		"						
R65		"	330 Ω	"	"		"						
R66		"	390 Ω	"	"		"						
R67		"	68 Ω	"	"		"						
R68		"	56 Ω	"	"		"						
R69		"	47 Ω	"	"		"						
R70		"	56 Ω	"	"		"						
R71		"	56 Ω	"	"		"						
R72		"	56 Ω	"	"		"						
	182-9040	Printed Circuit Board 182-900 (3 of the circuit boards are divided into halves) Switch type M x 4/8 x 6 K T = 12					NTP	4					
							EBC						
SIG./DATO	INGENØRFIRMA N. TØNNES PEDERSEN A/S						STYKLISTE						
30.4.71 BM/DG	Switch Unit 179-A1 (part of 179-120) Electrical Partslist						.....2 Blad... Blad...2.....						
							179-A131-A4						

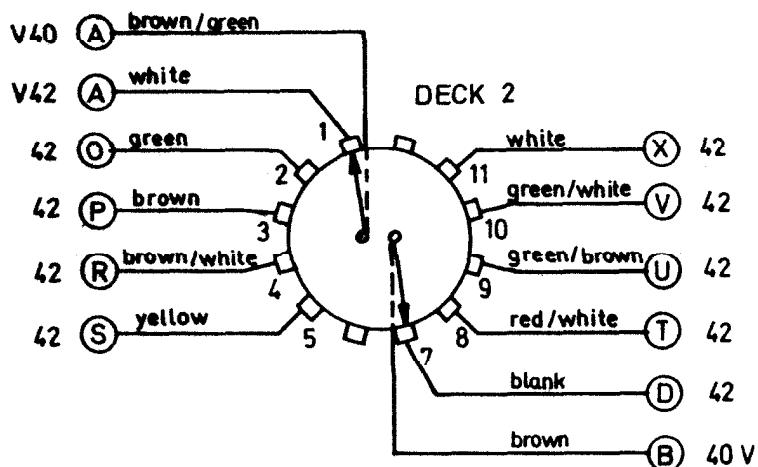
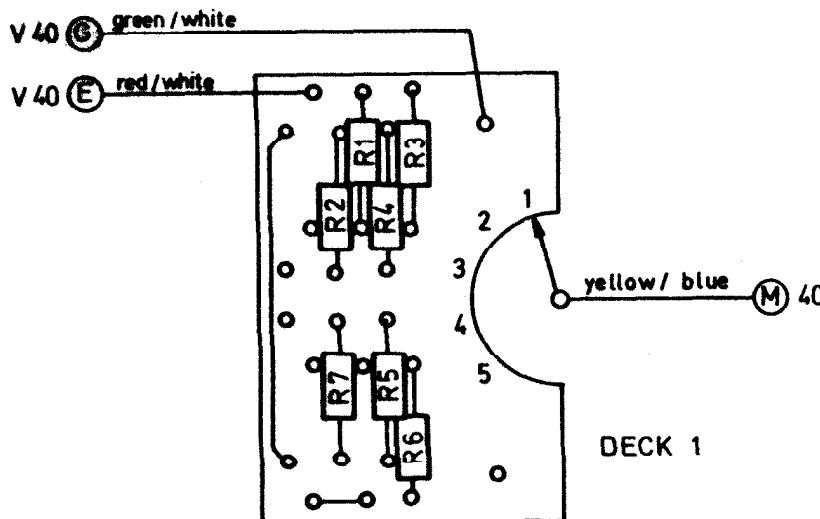


DECK 1



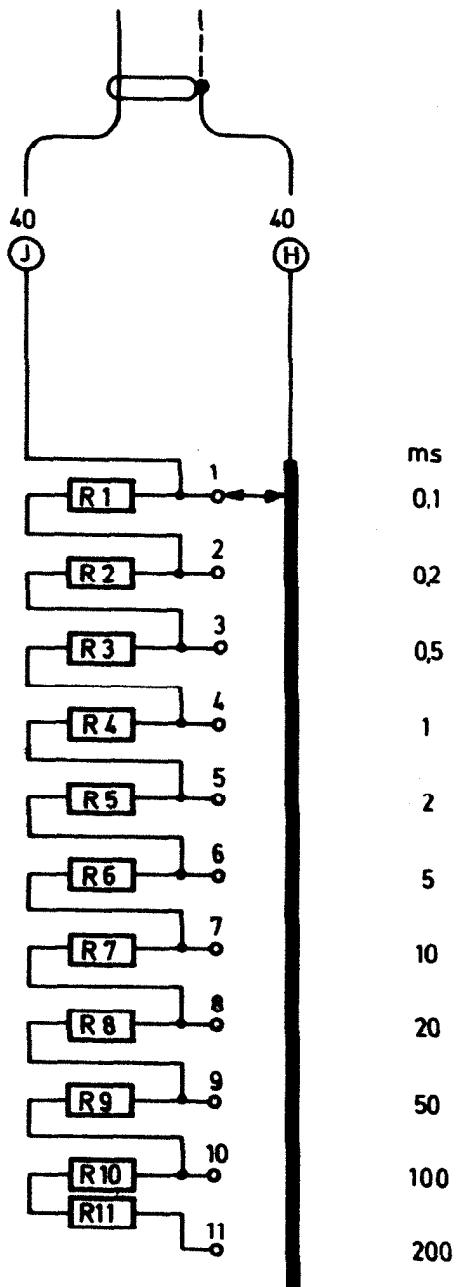
DECK 2

Målestok		INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	12-5-71. IW
Tolerance	$\pm$ mm $\pm$ °	Switch Unit 179-A2 (part of 179-120)	Godk.	
Materiale				TEGNING NR.
Behandl.		Function: Ratio		
Del af		Diagram		179-A230-A-4
Antal				

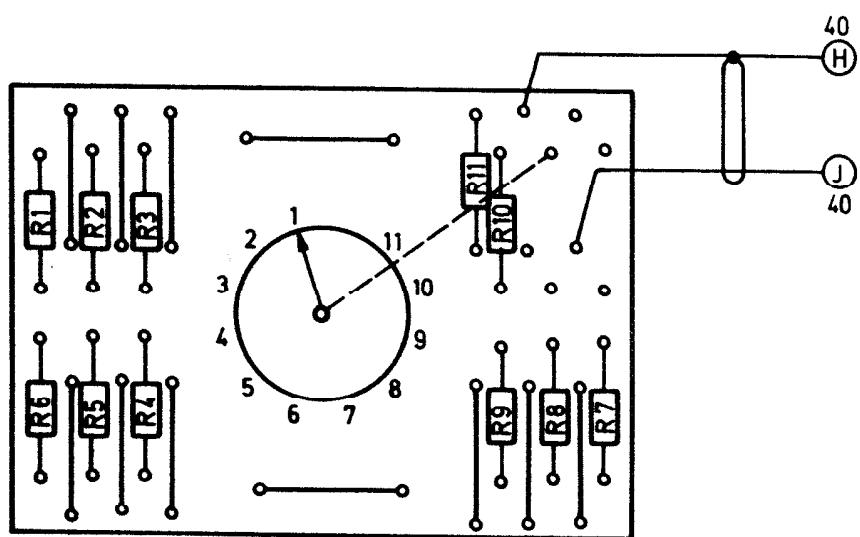


Målestok	2:1	INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	11-5-71 IW
Tolerance	$\pm$ mm $\pm$ °	Switch Unit 179-A2 (part of 179-120)	Godk.	
Materiale				TEGNING NR.
Behandl.		Function : Ratio		
Del af		Component Lay - out		179 - A 241 - A - 4
Antal				

POS.	TEGN. NR.	BETEGNELSE					MATERIALE	ANT.
R1		Resistor	1.8kΩ	1/8W	5%		Resista SK2	
R2		"	150 Ω	"	"		"	
R3		"	470 Ω	"	"		"	
R4		"	82 Ω	"	"		"	
R5		"	330 Ω	"	"		"	
R6		"	33 Ω	"	"		"	
R7		"	82 Ω	"	"		"	
	182-9040	Printed Circuit Board	182-900				NTP	
		Switch type Mx 2/4 x 5 K					EBE	
SIG./DATO	INGENØRFIRMA N. TØNNES PEDERSEN &						STYKLISTE	
30.4.71	Switch Unit 179-A2 (part of 179-120)						.....1.....	
BM/DG.	Electrical Partslist						179-A231-A-4	

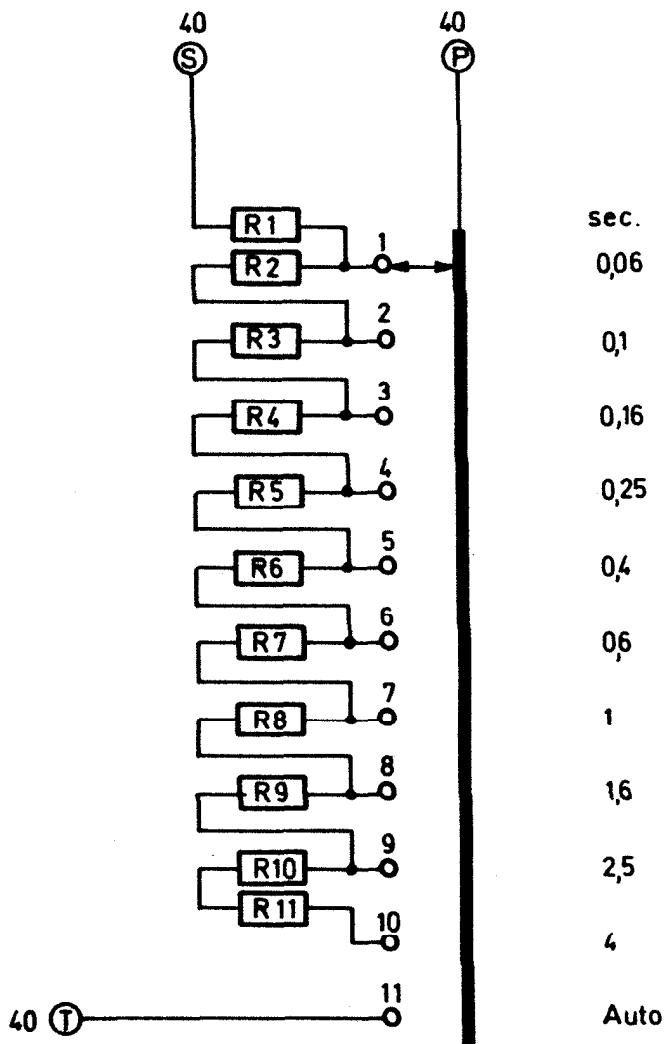


Pos:	Antal:	Materiale:	Behandl:	Del af
Målestok:				
Tolerance:	± mm			
Tegnet:	2-2-77 TL			
Godkendt:				
Revideret:				
		Switch Unit 179 - A3 (Part of 179-140)		
		Funcion: Attack		
		Diagram		
				NTP NTP ELEKTRONIK A/S
				179 - A330 - A-4

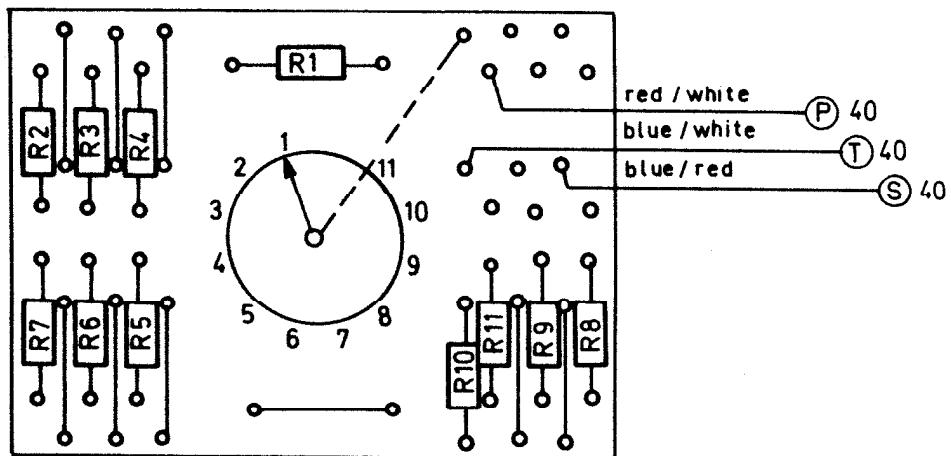


Pos.	Antal:	Materiale:	Behandl.	Del af
Målestok:				
Tolerance:	± mm			
Tegnet:	2-2-77 TL			
Godkendt:				
Revideret:				
<b>Switch Unit 179-A3 (Part of 179-140)</b> <b>Function: Attack</b> <b>Components Lay-out</b>				
 <b>NTP</b> <small>NTP ELEKTRONIK A/S</small>				
<b>179-A341-A-4</b>				

POS.	TEGN. NR.	BETEGNELSE					MATERIALE	ANT.
R1		Resistor	220 $\Omega$	1,8W	5%		Resista SK 2	
R2		"	680 $\Omega$	"	"		"	
R3		"	1.2k $\Omega$	"	"		"	
R4		"	2.2k $\Omega$	"	"		"	
R5		"	6.8k $\Omega$	"	"		"	
R6		"	12k $\Omega$	"	"		"	
R7		"	27k $\Omega$	"	"		"	
R8		"	82k $\Omega$	"	"		"	
R9		"	180k $\Omega$	"	"		"	
R10		"	330k $\Omega$	"	"		"	
R11	182-9040	Printed Circuit Board	182-900				NTP	
		Switch type Mx 1/1 x 11 K	T = 12				EBE	
SIG./DATO	INGENIØRFIRMA N. TØNNES PEDERSEN A/S						STYKLISTE	
30.4.71 BM/DG	Switch Unit 179-A3 (part of 179-120) Electrical Partslist						1 Blad - Blad 1	
							179-A331-A-4	



Mølestok		INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	12-5-71 IW
Tolerance	$\pm$ mm $\pm$ °			
Materiale		Switch Unit 179 - A4 (part of 179 120)	Godk.	
Behandl.		Function : Recovery	TEGNING NR.	
Del af		Diagram		179-A430-A-4
Antal				



Målestok	2:1	INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	11-5-71-(W)
Tolerance	$\pm$ mm $\pm$ °	Switch Unit 179-A4 (part of 179-120)		
Materiale			Godk.	
Behandl.		Function: Recovery	TEGNING NR.	
Del af		Component Lay-out		179-A441-A4
Antal				

POS.	TEGN. NR.	BETEGNELSE					MATERIALE	ANT.
R1		Resistor	47kΩ	1/8W	5%		Resista Sk 2	
R2		"	33kΩ	"	"		"	
R3		"	39kΩ	"	"		"	
R4		"	68kΩ	"	"		"	
R5		"	120kΩ	"	"		"	
R6		"	180kΩ	"	"		"	
R7		"	390kΩ	"	"		"	
R8		"	560kΩ	"	"		"	
R9		"	680kΩ	"	"		"	
R10		"	470kΩ	"	"		"	
R11		"	1MΩ	"	"		"	
182-9040		Printed Circuit Board 182-900					NTP	
		Switch type Mx 1/1 x 11 K T-12					EBC	
SIG./DATO		INGENØRFIRMA N. TØNNES PEDERSEN A/S					STYKLISTE	
30.4.71		Switch Unit 179-A4 (part of 179-120)					.....1.....Blad..... - Blad.....1.....	
BM/DG		Electrical Partslist					179-A431-A-4	